IN THE CLAIMS:

1   1-26. (CANCELLED)

1   27. (NEW) A method comprising;

2   executing an application on a network device, the application having a plurality of

3   modules each associated with one or more layers of a hierarchy of communication proto-

4   cols;

5   storing, in a memory space associated with the application, a connection data

6   structure, the connection data structure storing together data for the plurality of modules

7   of the application for a connection maintained by the network device;

8   forming a unique connection identifier for the connection;

9   independently checkpointing portions of the connection data structure for differ-

10   ent modules into a memory space associated with a checkpoint server, the portions of the

11   connection data structure each being embedded with the unique connection identifier and

12   stored separately in the memory space associated with the checkpoint server; and

13   in response to a restart or failure of the application executing on the network de-

14   vice, restoring the connection data structure in the memory space associated with the ap-

15   plication, by retrieving the separately stored portions of the connection data structure for

16   at least some of the different modules from the memory space associated with a check-

17   point server and combining them to reform the connection data structure in the memory

18   space associated with the application.

1   28. (NEW) The method of claim 27, wherein the independently checkpointing comprises:

2   determining for each module of the plurality of modules when the module re-

3   quires a checkpoint of the module's portion of the connection data structure; and

4   in response to the determining a particular module requires a checkpoint, check-

5   pointing the particular module's portion of the connection data structure into the memory

6   space associated with the checkpoint server.

1   29. (NEW) The method of claim 27, wherein the independently checkpointing comprises:

2   determining there has been a state change of the connection;

3   and

4   in response to the state change, checkpointing at least one particular module's

5   portion of the connection data structure into the memory space associated with the check-

6   point server.

1   30. (NEW) The method of claim 27, wherein the independently checkpointing is per-

2   formed individually by each module, such that each module checkpoints its own portion

3   of the connection data structure, and the retrieving is performed individually by each

4   module, such that each module retrieves its own portion of the connection data structure.

1   31. (NEW) The method of claim 27, wherein the application is a firewall application and

2   the plurality of modules are modules within the firewall application.

1   32. (NEW) The method of claim 27, wherein the forming a unique connection identifier

2   for the connection comprises:

3   combining a source address and a destination address of a packet associated with

4   the connection.

1   33. (NEW) The method of claim 27, wherein the plurality of modules include at least a

2   module associated with Transmission Control Protocol (TCP), User Datagram Protocol

3   (UDP), or File Transfer Protocol (FTP).

1   34. (NEW) The method of claim 27 wherein a separate connection data structure is main-

2   tained for each connection of a plurality of connections maintained by the network de-

3   vice.

1   35. (NEW) The method of claim 27, further comprising:

2   executing the checkpoint server on the network device along with the application,

3   and wherein the memory space associated with the checkpoint server is memory space

4   provided by the network device separate from the memory space associated with the ap-

5   plication.

1   36. (NEW) The method of claim 27, further comprising:

2   executing the checkpoint server on a device other than the network device execut-

3   ing the application.

1   37. (NEW) An apparatus comprising:

2   a microprocessor configured to execute an application and a checkpoint server,

3   the application having a plurality of modules each associated with one or more layers of a

4   hierarchy of communication protocols;

5   a memory having a memory space associated with the application and having a

6   separate memory space associated with the checkpoint server; and

7   the microprocessor further configured to execute instructions to store a connection

8   data structure that holds together data for the plurality of modules of the application re-

9   lated to a particular connection maintained by the apparatus, to form a unique connection

10 identifier for the connection, to independently checkpoint portions of the connection data

11 structure for different modules into the memory space associated with the checkpoint

12 server where the portions are each embed with the unique connection identifier yet stored

13 separately, and to restore, in response to a restart or failure of the application, the connec-

14 tion data structure into the memory space associated with the application, by retrieval of

15 the separately stored portions of the connection data structure for at least some of the dif-

16 ferent modules from the memory space associated with a checkpoint server and reassem-

17 bly of the portions to reform the connection data structure in the memory space associ-

18 ated with the application.

1 38. (NEW) The apparatus of claim 37, wherein the instructions to independently check-

2 point comprise instructions to determine for each module of the plurality of modules

3 when the module requires a checkpoint of the module's portion of the connection data

4 structure and to, in response to determination a particular module requires a checkpoint,

5 checkpoint the particular module's portion of the connection data structure into the mem-

6 ory space associated with the checkpoint server.

1 39. (NEW) The apparatus of claim 37, wherein the instructions to independently check-

2 point comprise instructions to determine there has been a state change of the connection,

3 and to, in response to the state change, checkpoint at least one particular module's portion

4 of the connection data structure into the memory space associated with a checkpoint

5 server.

1 40. (NEW) The apparatus of claim 37, wherein the application is a firewall application

2 and the plurality of modules are modules within the firewall application.

1 41. (NEW) The apparatus of claim 37 wherein the instructions to form the unique con-

2 nection identifier for the connection comprise instructions to combine a source address

3 and a destination address of a packet associated with the connection.

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1   42. (NEW) The apparatus of claim 37 wherein the plurality of modules include at least a

2   module associated with Transmission Control Protocol (TCP), User Datagram Protocol

3   (UDP), or File Transfer Protocol (FTP).

1   43. (NEW) The apparatus of claim 37 wherein a separate connection data structure is

2   maintained for each connection of a plurality of connections maintained by the apparatus.

1   44. (NEW) A system comprising;

2   a network device configured to execute an application, the application having a

3   plurality of modules each associated with one or more layers of a hierarchy of communi-

4   cation protocols, the network device further configured to store in a memory space asso-

5   ciated with the application a connection data structure, the connection data structure

6   maintaining together data for the plurality of modules of the application for a connection

7   maintained by the network device, the network device further configured to independ-

8   ently checkpoint portions of the connection data structure for different modules; and

9   a checkpoint server configured to store in an associate memory space the inde-

10   pendently checkpointed portions of the connection data structure, the portions of the con-

11   nection data structure each being embedded with a unique connection identifier associ-

12   ated with the connection and stored separately in the memory space associated with the

13   checkpoint server, the checkpoint server configured to, in response to a restart or failure

14   of the application executing on the network device, restore at least a part of the connec-

15   tion data structure to the memory space associated with the application, by retrieval of the

16   separately-stored portions of the connection data structure for at least some of the differ-

17   ent modules from the memory space associated with a checkpoint server and reassembly

18   of the portions to reform the at least a part of the connection data structure in the memory

19   space associated with the application.

1   45. (NEW) The system of claim 55, wherein the checkpoint server is further configured

2   to determine for each module of the plurality of modules when the module requires a

3   checkpoint of the module's portion of the connection data structure, and to, in response to

4   determination that a particular module requires a checkpoint, checkpoint the particular

5   module's portion of the connection data structure into the memory space associated with

6   the checkpoint server.

1   46. (NEW) The system of claim 55, wherein the checkpoint server is further configured

2   to determine there has been a state change of the connection, and in response to the state

3   change, checkpoint at least one particular module's portion of the connection data struc-

4   ture into the memory space associated with the checkpoint server.